Scientific American.

THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL AND OTHER IMPROVEMENTS.

Vol. 4. New York, December 30, 1848. No. 15.

THE
SCIENTIFIC AMERICAN:
CIRCULATION 11,500.
PUBLISHED WEEKLY.
At 128 Fulton Street, New York (Sun Building,) and 13 Court Street, Boston, Mass.
By Munn & Company.
The Principal Office being at New York.

TERMS—$2 a year—$1 in advance, and the remainder in 6 months.

☞See advertisement on last page.

Poetry.

THE SOWER.

I saw a sower walking slow
Across the Earth from East to West;
His hair was white as mountain snow,
His head dropped forward on his breast.

With shrivelled hands he flung his seed,
Nor ever turned to look behind;
Of sight or sound he took no heed,
It seemed he was both deaf and blind.

His dim face showed no soul beneath,
Yet in my heart I felt a stir,
As if I looked upon the sheath
That once had clasped Excalibur.

I heard as still the seed he cast,
How crooning to himself he sung,
"I sow again the holy Past,
The happy days when I was young.

"Then all was wheat without a tare.
Then all was righteous, fair, and true;
And I am he whose thoughtful care
Shall plant the Old World in the New.

"The fruitful germs I scatter free,
With busy hand, while all men sleep—
In Europe now, from sea to sea,
The nations bless me as they reap."

Then I looked back upon his path,
And heard the clash of glitt'ring steel,
When man faced man in deadly wrath,
While clanged the tocsin's hurrying peal.

The sky with burning towns flared red,
Nearer the noise of fighting rolled,
And brothers' blood, by brothers shed,
Crept curdling over the pavements cold.

Then marked I now each germ of truth,
Which through the dotard's fingers ran,
Was mated with a dragon's tooth,
Whence there sprung up an armed man.

I shouted, but he could not hear;
Made signs, but these he could not see;
And still, without a doubt or fear,
Broadcast he scattered anarchy.

Long to my straining ears, the blast
Brought faintly back the words he sung,
"I sow again the holy Past,
The happy days when I was young."

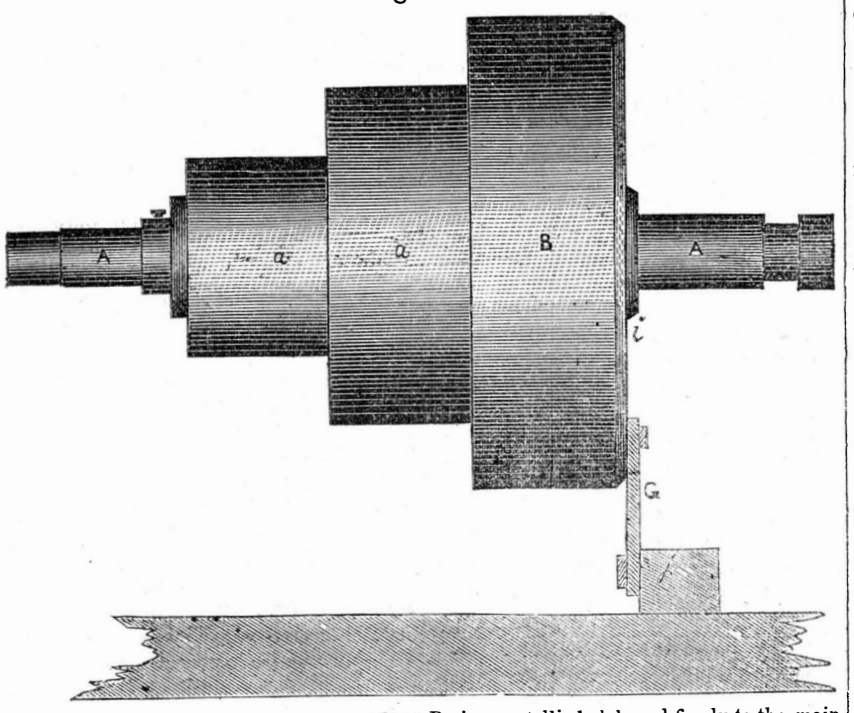
HOPE.

A rainbow, bent from a morning cloud,
And kiss'd the dewy earth—
It smiled, like an angel visitant,
Through the tears that gave it birth;
And midway in the crimson'd sky,
Its mellow'd lustre met the eye.

Thus, Hope's bright rainbow, like a gleam,
Of sunlight glowing there,
Attracts the toil-worn child of earth
From life's turmoil and care;
And when through grief he sighs for Heaven,
He sees it in his prayer,
And thus enjoys, tho' here depress'd,
A foretaste of that place of rest.

COMPENSATION DOUBLE GEARING FOR LATHES.

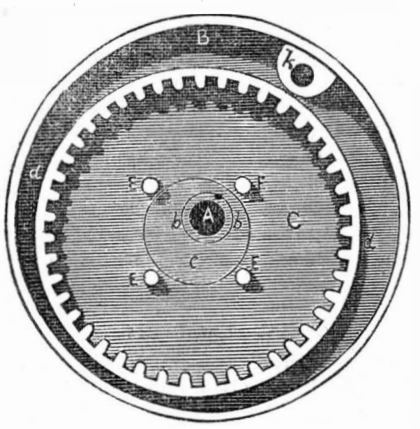
Figure 1.



This compensation lathe gearing, is the invention of Mr. Benjamin Arnold, of East Greenwich, Rhode Island, and we venture to say that it is the most ingenious system of lathe gearing ever presented to the public.

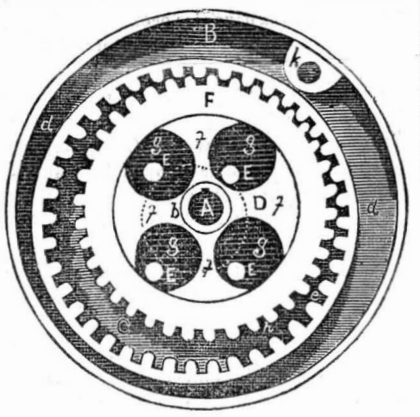
Fig. 1, is a side elevation of the pulleys and shaft upon which they turn loosely. Fig. 2 is the larger cog wheel enclosed within the large pulley, and the eccentric for turning the same. Fig. 3, is the cog wheel with the cogged metallic ring and hub with curved arms inserted in their places within said cog wheel. Fig. 4, is a vertical section through the centre of the large pulley, large cog wheel and eccentric. We must describe all the figures together, and it will require the most careful attention of the reader—even a skilful mechanic to understand it, but we are sure that our description is as plain as possibly can be. Similar letters refer to like parts. The nature of this invention consists in providing

Fig. 2.



within the large pulley an arrangement of eccentric gearing to increase or diminish the speed of the shaft, with a corresponding increase or diminution of power with the speed. A, is the main shaft, sustained in suitable bearings. B, is the large pulley made of iron and hollow, turning loosely on the shaft, and having a hub *b*, cast at its centre concentric with its periphery surrounded by a circular block of steel *c*, arranged eccentric with its centre, and secured to the inside face of the pulley. C, is a metal wheel, with a circular opening at the centre and having a hub *l*, on its face and with a circular flange *d*, at its periphery, on the inner surface of which is formed a series of cogs *e*, fig. 3. The opening in the centre of this wheel fits over the eccentric C, which revolves within the same,—D, is a metallic hub keyed firmly to the main shaft with four sectoral arms *f*, which fit exactly inside the cogged ring F, and curved so as to make a circular space between them.—E, are four pins projecting from the face of

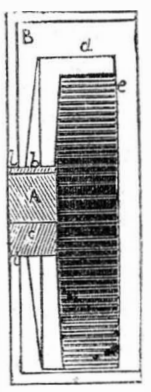
Fig. 3.



the metal wheel to catch into *g*. F, is a circular metallic ring made smooth on its inner periphery in order to fit the periphery of D, which turns within it. It has cogs *h*, which gear with cogs *e*, of the projecting edge of the large wheel C, and secured firmly to the inside of the face plate *i*, of the pulley B. G, is a connecting bar secured to the foot of the frame to hold the face plate *i* and the ring F stationary during the revolutions of the pulley *s*. The stationary parts of the lathe are made and operated like others in use.

Operation.—Motion being communicated by the band to the pulleys, the eccentric *c*,

Fig. 4.



secured on the inner surface of B, and turning within the opening in the centre of the cog wheel C, will cause the same to revolve around the stationary circular cogged ring F secured to the detached face plate *i*, of the pulley, and held stationary by the bar G, and to which the large wheel C is geared by the cogs on the inner periphery of the projecting edge *d*, with a speed proportioned with the relative number of cogs on the respective wheels, for instance if the larger wheel C, has 60 cogs in its inner periphery and the smaller stationary wheel has 59, the eccentric *e*, will make 60 revolutions while the larger wheel will be making one revolution, and so on in this ratio, the wheel C going around the stationary cogged ring F, just so many teeth as it has more than said cogged ring, at each revolution of the eccentric. The motion of the pins or bolts E being also eccentric to the centre of the main shaft A, will alternately strike the concave sides of the sector arms *f*, of the hub D, during their revolutions and cause them to revolve with a decreased speed and carry with them the main shaft to which they are keyed, thus forming a simple and effective gearing between the pullies *s*, and the gearing enclosed in the inside of B, which gives various speeds to the shaft and with a power proportioned to the speed. The lathe can also be used for single gearing, with very little trouble. What a compact gearing this is—and whatever any mechanic may think about its general usefulness, none will dispute its ingenuity. Measures have been taken to secure a patent.

RAIL ROAD NEWS.

Railroad to the Pacific.

In 1838 a company of French citizens received a charter from the government of New Granada for the purpose of constructing a Railroad across the isthmus of Panama. These French gentlemen either found themselves unrble to construct the road, or from some other cause sold out their interest and made a transfer of the charter to Messrs. Aspinwall, Stephens and Chauncey, American citizens.—These gentlemen claim the exclusive right of way through the isthmus, and have petitioned Congress to enter into a contract with them for the transportation of troops, &c. across the Isthmus to the Pacific for a certain period.—The route has already been surveyed, and Messrs. Aspinwall & Co. are willing to give bonds for the construction of the road within a certain period. There are other petitioners for the right of way to construct a railroad across the isthmus. Gen. Dix is of opinion that the treaty of our government with New Granada gave us no right to confer power on any company to construct a railroad on that route. It is difficult to tell what may be the fate of those petitions. Messrs. Aspinwall & Co. should go on and construct the road under their charter, and then our government would both protect them in their rights and patronize them likewise. We like the ideas thrown out by the New York Sun in reference to the construction of a railroad through our newly acquired territories to California direct. It would be a long road and an expensive one, but then look at the difference between it and one across the Panama—through the territory of a foreign government, although only 60 miles long. A Railroad through New Mexico would be the means of developing the resources of a country but little known to ourselves yet.

The Sun proposes the employing of all the stout convicts in the State Prisons in the construction of Pacific Railroad, and we certainly go for that measure, if it can be carried out. We think that this would be a much better way to employ the convicts, than to have their labor competing with that of honest mechanics, as it now is, in every market.

The wires of the Southern Telegraph lines between Philadelphia and Trenton were broken by the storms last week.

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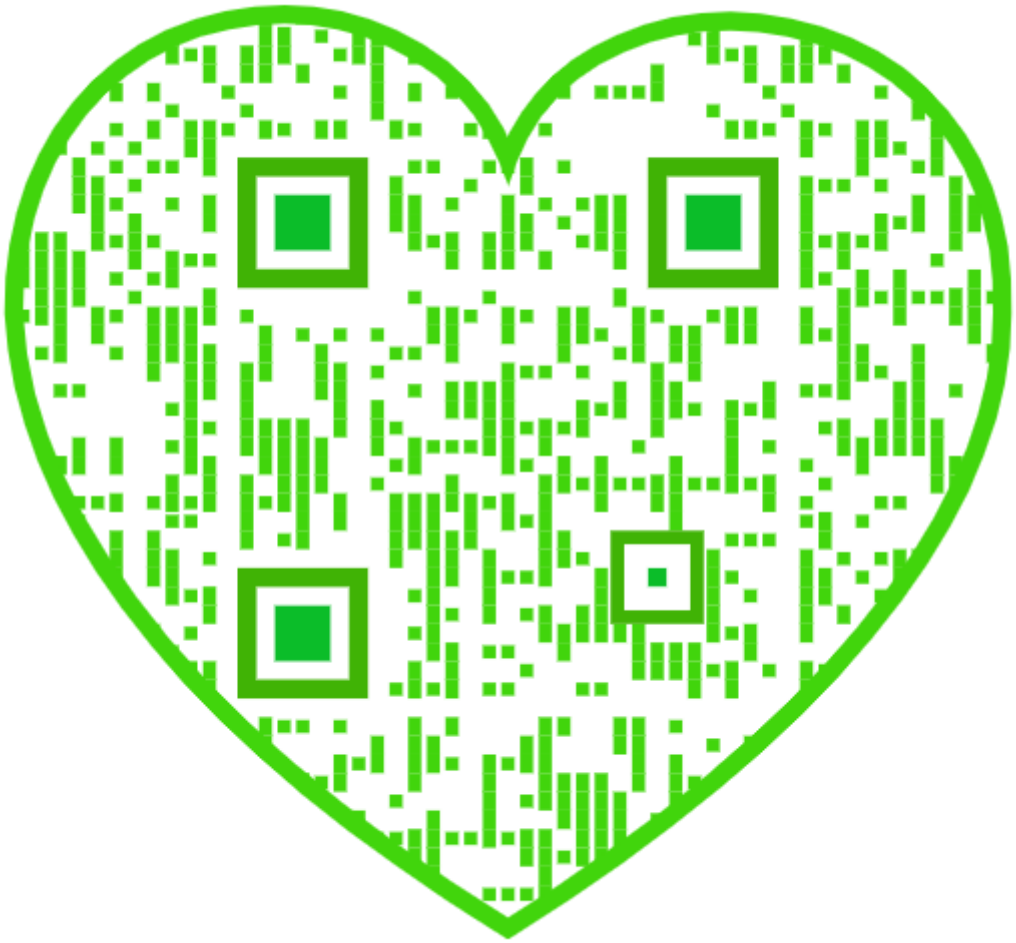

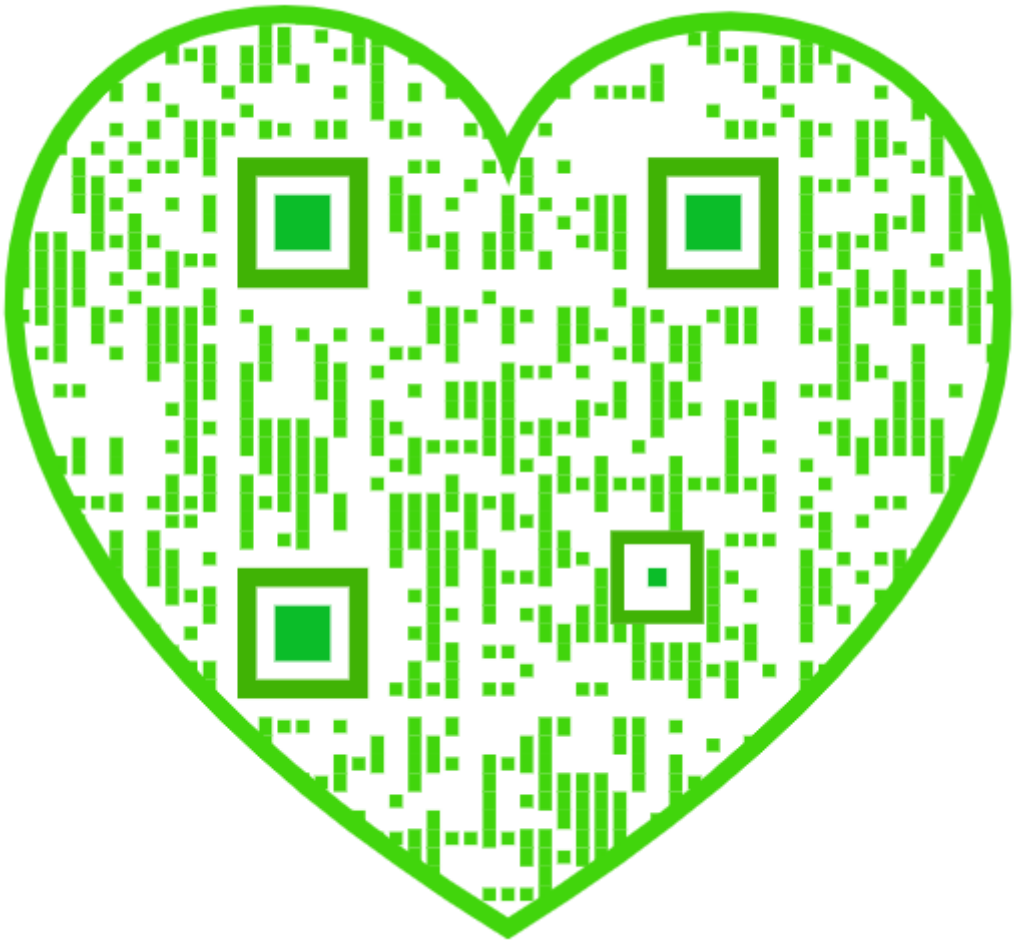

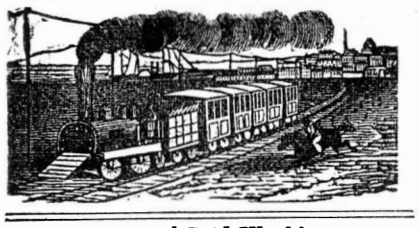

Gold and Gold Washing.

The gold region in California is said to extend on both sides of the Sierre Neuvada as far south as the head waters of the San Joanquin River—a distance of 400 miles in length and 100 in breadth. The ore is in a virgin state, disseminated in small particles, and is found in three distinct deposits—sand and gravel beds, or decomposed granite, and intermixed with a kind of slate. It is generally found from immediately beneath the surface to a distance of four feet, and its position, and the pure state in which it is found, is believed to be the result of a general volcanic eruption. The gold region lies within about one hundred and two hundred and forty miles of San Francisco; it is about the same distance from Monterey.

There are two kinds of *diggins* in the gold region the *wet* and the dry. There is more gold found in the wet than in the dry diggins. The implements used are pickaxes, a small spade and a wash pan. Many of the diggers have not these tools but they are the best for the purpose. They should not be heavy but made of good stuff. The simplest method of testing the sand is to put it into a tin basin and wash it carefully agitating the vessel so that the gold particles may subside and the sand and other sediment be poured out—repeating this operation until the gold only remains. This is the way to do with the sand, but as the California gold is found—*most* of it in a scaly form, care must be taken in the washing not to pour gold away with the muddy water. Some prefer iron pans, but tin pans are better, and a good wood pan we would prefer to all others. In some places the scales have been found so plenty and large, that no washing was employed, and hence as much fine gold was thrown away as what has been picked up in large pieces. The operation is simple but the emigrant should be warned against use of large seives for the washing except, for to wash the coarse earth and extract the large gravel, allowing the finer to fall into the close pans or troughs. Were we to go to California we would take one, not very large, copper wired seive and two strong tin pans, a small pickaxe and a spade.

The gold fever is as strong as ever and companies are formed and forming in a great number of places throughout the various states. The specimens of ore that have been tested at the Mint in Philadelphia, have yielded a very high per centage. There is no doubt but what considerable iron pyrites may be picked up for pure gold,—a chemical test is the only remedy for the digger, and Mr. Kent the chemist in John st., can furnish any person from this city with the same genuine article. We perceive that Prof. Horsford of Harvard University is of opinion that the *scaly* form in which much of the gold is found, is owing to the glacial action in the California mountains, which flattened the granular particles of the metal, as the glacier passed over them, —a curious conclusion we think.

Witchcraft in Washington.

A most singular affair has recently been disturbing the usual quiet of the eastern portion of the city of Washington. A young married woman has frequent fits of convulsions, and while in a fit she extracts pins with the utmost dexterity from the dresses of visiters and swallows them. The price of admission has been one dollar. Too small a charge, we think, for an exhibition of witchcraft in the 19th century and in the capital of the Union.

Cure for Lockjaw.

When any one runs a nail or any sharp iron in any part of his body, take a common smoke pipe, fill it with tobacco, light it well, then take a thin cloth or silk handkerchief, place it over the bowl of the pipe, and two or three pipefulls will be sufficient to set the wound discharging. If the wound has been some days standing, it will open it again, if the tobacco is good.

LITERARY NOTICES.

The Encyclopedia of Chemistry.

Numbers 13 and 14 of this theoretical and practical work, published by Carey and Hart of Philadelphia have been laid upon our table. It is edited by James C. Booth of the Franklin Institute, and Campbell Morfitt the author of "Applied Chemistry." Those who would desire to know all about the treatment of gold ore can find a full account of the same in No. 14. This Encyclopedia is the most popular work on chemistry ever published in America.

Youth's Cabinet.

We have received the January No. of this interesting work, edited by Rev. Dr. Woodworth. We cheerfully recommend it to the attention of parents who are desirous of having their children instructed in an agreeable and profitable manner. Every article in the work is well written and it is deserving a large circulation. Published at 155 Nassau st terms $1 per year.

The Ladies National Magazine.

The January No. of this unrivalled Magahas appeared on our table, and opens with three superb mezzotint engravings. Elsie Gray, The Pet, and the Fall of Jerusalem, *all beautifully executed.* The editorial department is in charge of Mrs. Ann S. Stephens, justly one of the most celebrated writers in America.—Too much cannot be said in favor of this popular work, and its enterprising publisher C. J. Peterson. Now is just the time to remit $2,00 and receive this popular work for 1 year; the January No. is worth that. Dewitt & Davenport are agents for New York city.

Diamonds in California.

Extract of a letter received by Mr. Buffum of this City, from his son Edward Gould Buffum, dated Pueb de los Angelos, Upper California, July 21:

Persons who have been at the "placers" say there is ample room for 50,000 people to work fifty years. It is doubtless the richest place in the world. Within a week or two past, diamonds and platina have also been found. These stories, strange as they may seem, are strictly true. I know them to be so. There will probably to be a great emigration to the country as soon as news gets spread at home, and I wish you would show —— this letter, and recommend to him to come by all means.—There is no humbug about this. New places are being discovered every day, and Peru and Mexico will ere long sink into insignificance compared with California. Everything connected with mining, as well as goods and provisions are selling in the mining region at most exorbitant prices. Pickaxes are worth fifty dollars apiece. Shovels twenty five dollars. Hoes ten dollars. Flour $100 a barrel. Cotton cloth $1,50 a yard, and every thing else in proportion."

The sheriff of Glasgow, (Mr. Allison, the historian of Europe,) says that the people of that city yearly spend £1,200,000 for intoxicating drinks; and that every Saturday night, and the greatest part of the Sabbath, at least thirty thousand persons are in a state of intoxication. And this is said to be "but a specimen of the whole nation." The cost of intoxicating drinks to the country, is estimated at £65,000,000 annually; besides an indirect expence of £40,000,000.

Here then we have an exhibtion of a people spending yearly £105,000,000 for a drug that destroys both soul and body,—voluntarily taxing themselves to destruction and continually revolting at the governmental taxes, which does not for the whole revenue exceed one half the amount of ardent spirits drunk, which is equal to 13 gallons for every individual per annum. Drunkenness is the vice of the Scottish people, and the great blame of this lies at the door of the clergymen.—Were they zealous for extinguishing this curse of the nation, they could soon do it.

Homestead Exemption.

The Exemption law in Wisconsin is, protection from execution for $1000 worth of property, and real estate not exceeding 40 acres, or a village lot not exceeding half an acre with the improvements thereon.

Michigan has the same law incorporated in her statute book.

Expedition to the Dead Sea.—Oriental Christians.

Lieut. Lynch, in a letter to the Union, giving an account of his expedition, makes mention that on the coast of Moab, he was surprised by a deputation of Christians from Kerak the Keijath of the Bible. He says:

The joy of this people at meeting was unbounded. They caressed us, brought us water and leban, (sour milk,) all they had, and some of them spent nearly the whole night hunting a wild boar, wherewith to regale us. When told that our forms of worship in America were different from theirs, they replied; "What matters it? Christ died for all! Do you not believe in him?—When told that we did, they said: "Then what are forms before God? He looks to the heart! We are brothers!" And brothers they continued to call us to the last.

We could not trace their origin, but concluded that they are either the descendants of one of the lost tribes converted to Christanity who, in the fastnesses of the mountains, had escaped the Mohammedan alternative of "the Koran or the sword," or the crusaders under the Christian Lord of Kerak. They number about 150 families, and live in the town—the only one now left in the once populous country of Moab. Within the walls are also the huts of 100 Muslim families, and outside are the black tents of the fierce tribe Cera-Keyeh, numbering 750 fighting men.

These poor Christians are much tyrannized over by their Muslim neighbors.

The object of all their hopes is to build a church sufficiently large to hold all their wives and children; for, with all their intolerance the Muslims respect the house of Him whom they call "Issa, the Prophet of the Christians."

The foundation and a part of the wall of a church have been built, but the work is discontinued from the want of means—the sirocco and the locust having swept their harvest for several years They gave me an appeal to their Christian brethern in America, which I promised to deliver.

An Ancient City.

The famous city of Petra, in Arabia, has been a theme of admiration and astonishment to all the tourists of recent times; but another town, apparently far more ancient, and of greater extent still, exists in the north of Affghanistan, and is known throughout the East by the name of Bameean. The city consists of a great number of apartments cut out of the solid rock. It is said that in many of them the walls was adorned with paintings which look still fresh, after centuries of desertion and solitude; some of them are adorned with the richest carved work. There are supposed to be more than twelve thousand of such habitations in Bameean; but the natives who are mostly Mohammedans, entertain a supersitious prejudice against inhabiting such homes. They have old traditions which declare them to have been the first habitations of mankind; and that strange city is casually mentioned by some of the classic authors; yet, by whom its rocky abodes were excavated, who were its inhabitants, or what their history—all have passed from the recollection of the world, and exists only in fabulous or uncertain tales.

Connubial Statistics.

The publishers of the Lowell Offering state in their last number, that in one mill during the past eighteen years, eighty-two of the "boys" and four hundred and five "girls" employed there have been married; and from another mill, one hundred and eighty-seven of the girls have been married during five years; and from a single room in another corporation, twenty-eight were married in one year.

Acid Springs.

A number of acid springs have been discovered in Byron, Genesee Co., N. Y. They are strongly impregnated with pure sulphur which increases in strength during a drought. The vegetable matter is killed around them. The water is colorless, and from a spring flows in a sufficient quantity to turn a grist mill. A similar spring is known to exist in Persia, Asia, where it is used to make sherbet, as a substitute for lemon.

The Smithson Institute.

The Smithsonian Institute, at Washington, is progressing rapidly. The last wing is being finished interiorly with taste and beauty. At the last entrance are steps leading to the right and left to the main gallery; in front of the rostrum are seats rising one above the other handsomely finished with carved tops and ends in the gothic style—both sides of the room have galleries; behind the stand is a small room with glass cases on the sides each having flues for conveying heated air to preserve plants, &c.; the windows are small diamond-shaped panes of colored glass, the tops rounded: the doors have also round tops made of North Carolina pine, in small strips based, and varnished. Everything is in taste and neatnes. The professors are making every arrangement for the consummation of their designs; and it is thought they will be ready for operation by the middle of this month.—The west wing is up and covered in, and the main building, whose towering heights will be the admiration of all, is advancing as fast as the skill and perseverance of the directors can impel it.

Buckwheat Cakes.

The griddle on which cakes are baked should never be touched with grease: Firstly, because it imparts a rancid taste to the cakes. Secondly, if a cooking stove be used it fills the kitchen if not the whole house, with the smell of burnt grease—to say nothing of the parade, and boasting to one's neighbors by betraying what we are to have for breakfast. Wash the griddle with hot soap suds, scour with dry sand, and when heated for use rub it well with a spoonful of fine salt and a coarse cloth. It will then be ready to receive the cakes. After each cake is removed, the salt rubbing must be repeated. If the first does not succeed, try it again, and you will ever after follow the advice of on old housekeeper.

Natural Manufactures for the Market.

The beverage called tea—a natural product made of blackberry leaves.

Sausages made up in the most approved forms by a secret process known only to the manufacturers which enables them to be retailed at very low prices.

Milk of delicious flavor made up of those delicious ingredients chalk, water and molasses—and named Orange County.

Honey; that beautiful delightful substance, supposed by the vulgar to be the product of the bee, but which is really made of sugar and starch by a new way of mixing them.

Arsenic.

In case of a person taking arsenic, the super-carbonate of iron is the only autidote that can be relied on. The whites of eggs should be given as soon as possible to coat the stomach, so that the poison cannot act upon it, and a stomach pump should be promptly used.

Eclipses in 1849.

In the year 1849 there will be four eclipses —two of the sun and two of the moon. One of the lunar eclipse will be of the sun, on the 22d of February, and will be visible in the western portions of Asia and the northwestern portions of North America. The second of the moon, on the fifth of March, and will be visible throughout the United States. The third will be a total eclipse of the sun on the 17th August; and the fourth an eclipse of the moon on the 2d of September, both invisible in the United States.

Protection of the Telegraph.

In the Louisiana Legislature, a bill has been introduced, punishing by fine and imprisonment, the operators and other officers attached to Telegraph Companies, who shall refuse or omit to transmit messages over their lines in the order they are received.

The Mechanics in this State are going to make great efforts this winter for a reform in the Lien law.

The Editor of the Journal of Commerce saw an Irishman the other day light his pipe at a pile of lime he was slacking with water. Water does not always quench fire.

Use not evasions when called upon to do a good action, nor excuses when you are reproached for doing a bad one.

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Hubbell's Fire Arms.—Remarks of William W. Hubbell, on Fire Arms.

In Fire Arms, as with all other successful inventions, there are certain standard principles on which the existence and operation of the machine or thing is founded, and the instant that a departure is made from these foundations the whole structure falls, and becomes a mass of chaos and imperfection.

ON LOADING AGAINST A SOLID PERMANENT END TO THE CALIBRE OF THE BARREL.

This principle of loading has stood the test of ages with unwavering supremacy, and whatever may have been the results of the almost innumerable efforts to discover others, that are to be found mentioned in the works on such subjects, I still cannot perceive that any other principle of loading ever was adopted, or ever aided in the prosecution of a military enterprise to a successful issue. It was this principle that operated at the battle of Waterloo, and throughout the American Revolution, and wherever I look to the circumstance of such execution from the discharge of Musketry, Rifles, or Artillery, I cannot but at once perceive that the principle of loading, which exists in my Fire Arms, viz: that of pressing the charge of powder against a permanent end of the calibre of the gun was adopted and used as a standard feature. By theroetical reasoning, this principle appears to me to be perfect, because the entire action for forcing the bullet operates direct against this permanent end, which therefore to be undisturbed, and to prevent a superfluous escape of the explosive gas of the gunpowder, and also to allow the charge to rest firmly without any imposibility of vaccuum or space to exist in its dimensions, should be both solid and tight—both being attained in my Fire arms, the Breech of which is a perfectly solid piece of metal, which receives the charge against the firm end of its calibre, by pressing it down against it from a false muzzle created by opening the Breech. The charge is therefore loaded on the principle of guns loading at the muzzle, the difference being only one of distance; I having the charge to travel a short distance by the peculiar construction of my gun, whilst to attain the same position in guns that load at the extreme muzzle, the charge travels a longer distance.

As regards the state of efficiency of the powder when loaded, my Fire Arms possess decided advantages over the arms that load at the muzzle. The reasons given by me are as follows: By firing any gun two or three times, moisture originated from the exploded saltpetre adheres to the interior of the barrel, and when the powder is poured in at the muzzle it comes in contact with this moist surface, and therefore it, by its nature, being always susceptible of freely imbibing moisture, in a moist state passes to the Breech of the gun, which is slightly increased by the bullet driving before it, in its passage to the powder, additional moisture and a quantity of the refuse of the burnt powder, which impairs the explosive power of the powder, and frequently in a short time renders it totally unfit for use But these defects never come into action in loading my Fire Arms, as the powder goes in at the Breech immediately to its proper position, and never passes down the moist barrel. rests in the Breech in a perfectly dry state, and when fired, explodes simultaneously, and exerts its whole power to force the bullet; hence it is that my Fire Arms force a bullet with superior rapidity, even with a less quantity of powder than other Fire Arms require.

ON FIRING THE POWDER.

Many ways of firing the charges of guns have been employed, but the most usual and most successful way has been to force the the fire to the powder at the back part, though at the side thereof, which appeared to my mind to be liable to exert an unequal action on the surface of the bullet, but as the Arms have Breeches which screw into the barrel, the deficiency cannot be thoroughly remedied in any other way than by altering them on to my principle, which can be readily done. The Breech of my Fire Arms being perfectly solid, I have employed the advantage that it presented, and admitted the fire at the centre of a semi-spherical hollow that forms the back end of the Breech, consequently the fire spreads from the centre of the extreme back end of the breech, and therefore fires the charge uniformly, causing thereby an uniform action on the bullet. Another important feature of firing the charge in the Breech of my Fire Arms is, that the motion of the fire in going to the charge is at right angles with the centre line of the calibre of the gun, which allows an equality of action of the fire on the charge. But if, as in the patent arms having screw breeches, the fire entered on a line parallel with that of the calibre, a greater force would be thrown by this fire on the powder directly opposite to it than elsewhere, and therefore cause an irregular explosion of the charge, I consequently claim a superiority for my Fire Arms in the manner of firing the charge, proved, by theoretical exposition, and confirmed by actual trials with fine shot and bullets, in competition with arms of other kinds.

PASSAGE OF THE BULLET ALONG THE CALIBRE OF THE GUN.

A variety of ways have been tried on passing the bullet in the barrel; my opinion, however, is, that arms loading at the breech present decided advantages for a perfect action of the bullet, as it can fit the barrel very tightly and yet go freely into the breech, and that the bullet should be of precisely the same diameter as the calibre of the gun; having the bullet larger causes it to become elongated, and liable to be thrown out of a direct course by the action of the passing wind being consequently irregular on its surface while a bullet the same size as the calibre is packed by its cartridge cover so very tight that it bears against its entire surface, still keeps the barrel free from refuse powder, has no windage, and passes out of the barrel in a perfectly globular shape and consequently flies with the utmost precision. Smooth bored barrels allow the bullet to fly with more force than cut barrels, but with less precision than bullets fly having a rotary motion given to them by the cuts or winding creases in the barrel. The smooth bore is preferable for muskets, but the cut barrel is best for rifles.

ON THEIR MECHANICAL CONSTRUCTION.

I am well aware that there are many ways of loading guns at the Breech, but I cannot perceive perfection existing in any of the principles, but that conceived and matured by myself. The reasons are :—

1st. The recoil of the breech is received on a perfectly solid flat breech plate, and is therefore invariable.

2nd. The tendency of the power of the recoil, and the tendency of motion in opening and closing the Breech are entirely independent, neither exerting any influence on the other in its operation, and therefore not disturbing, wearing, or interfering with it in any way.

3rd. The Barrel can always be properly regulated in its position respectively with the Breech, by screwing up or loosening the bolts which brace it to the Breech plate attached to the stock of the gun, and therefore can never be thrown out of order by the use of the gun.

4th. The breech falls on a tongue solidly attached to the barrel, which cousequently, cannot vary, the Breech, therefore, must be always steady, and the gun cannot be fired unless the Breech is in its proper place, which makes it both safe to us and certain in its execution.

These four together with the peculiarities precedingly given, and belonging to my Fire Arms, form a degree of perfection which I think it would be destroying to alter, and folly for me, at any future time, to attempt to improve.

Meteoric Phenomena.

A large ball of red fire recently passed with great rapidity about three hundred feet above the ground, from north to south, near Glasgow, Scotland, and exploded with a loud noise like that of a cannon, shedding a brillant stream of white light and a shower like that of falling stars all around. About 30 minutes after another such ball of great size and splendor roared along in the same rage and burst with a great noise and light and part of the meteoric fragments alighted on the roof of a house in the neighbourhood.

Women love strength without imitating it—men, tenderness without returning it.

Treatment of Cholera.

The following is the course recommended by D. McCann of London, for the prevention and treatment of cholera which has been highly spoken of.

1. PREVENTION.—I recommend comfortable and nutritous animal food of the solid kind, warm clothing, an attention to regular hours, free ventilation, and cleanliness; also lime-washing the dwellings of the poor. I advise abstinence from spiritous and fermented liquors, from fruit and raw vegetables, from all salt fish and oysters—the latter especially—from all excesses which debilitate the constitution; and, above all things, I deprecate the use of strong purgative medicine.

2. THE EARLY OR PREMONITORY STAGE, AND ITS TREATMENT.—So far as my observation extended in 1832, I found that spasmodic cholera, with few exceptions, was preceded by certain premonitory symptons, of which diarrhœa or purging was the most prominent; but which symptom was often overlooked by the persons laboring under the attack. It therefore becomes of vital importance, now that we apprehend that cholera is taking the same route towards this country that it did in 1832, that every case of purging which may occur should, without loss of time, be arrested in its progress; for so fully convinced am I of the benefits resulting from a prompt attention to bowel complaints, that I believe that the actual cholera symptoms may, in the majority of cases, be thereby prevented. The purging is for the most part accompanied by nausea, and a disposition to vomit, followed by a sense of heat and weight in the stomach, slight cramps in the bowels and legs, great weakness, diminished action of the heart, and coldness of the surface of the body. It is essentially necessary to point out to the public, and more especially to the poor, such remedies for this, the early stage, as are at their command, and at what period of the disease they should be employed. When sickness with derangement of the bowels is felt, the patient, (if an adult) should mix a table spoonful of mustard, or double that quantity of common salt, in half a pint of warm water, a third part of either to be taken every ten minutes until free vomiting be produced; after the stomach has been well cleared out with more warm water, thirty drops of tincture of opium should be given in a glass of brandy and water, to be followed up with a pill composed of five grains of calomel and two grains of opium, for an adult; small doses of these to be taken at intervals of every two hours, until bile is observed to pass in the evacuation; but in the event of children being suddenly attacked with bowel complaints of this kind, I recommend one drop of the tincture of opium for each year of their age, to be given in sugar and water; but if under twelve years of age, then one grain of calomel is to be given every two hours, until the same effect, (the passing of bile) be visible in the evacuations. Families should also have in readiness a mixture of the following form :—Prepared chalk, ½ oz., white sugar, 2 lumps, cinnamon powder or aromatic confection, 2 drachms, tincture of catechu, 1 oz.; opiate confection I drachm; sal volatile, 2 drachms; cinnamon or peppermint water, half a pint, of which mixture an adult may take 3 tablespoonfuls after each disordered motion; and children under twelve years of age one table spoonful. I also strongly advise the use of an embrocation of heated turpentine to be rubbed over the bowels and extremities to which the addition of one-third part of the laudanum would be a most important improvement; should the ingredients of this embrocation not be at hand mustard poultices ought to be placed on the stomach and bowels. Common wine bottles or stone jars, filled with hot water, and rolled in flannel, are also to be applied to the stomach and feet. If the apartment be at all eligible, the patient should not be removed, but be kept in a perfectly horizontal position as any attempt to sit upright might prove fatal. The patient will experience a great relief from the cramps by having a bandage tied tight around the seat of pain. Cramp being one of the distressing symptoms in the disease, if not moved by the preceding means I can from recent experience speak highly of the internal administration of from two to five drops of chloroform in a little ginger tea or any warm fluid, as one of the most efficient agents in removing choleric spasm.

3. THE COLLAPSE, OR BLUE STAGE, AND ITS TREATMENT.—In this stage, all the powers of life are apparently suspended, in conquence of the intensity of liquid evacuations; the cramps increase in severity, and all the symptoms become aggravated. The treatment in this stage is as nearly allied as possible to that of the early stage, as the remedies there prescribed are now to be given more frequently, and in larger doses. Here I must call upon the attendants, to be unremitting in rubbing in the turpentime embrocation over the body and extremities, and to be prompt in giving to the patients stimulants, such as brandy, whiskey mixed in hot water, to which may be added a teaspoonful of the tincture of of ginger or of capsicum; and if these be not in readiness, they could give one teaspoonful of sal volatile instead, until reaction be produced.

THE RECOVERY.—It frequently happens that this stage is ushered in by an attack of fever, when it will become necessary to avoid the use of simulants, and to have recourse to the common saline draught, cooling drinks, mild diet of the farinaceous kind, such as arrowroot, sago, tapioca mixed with milk.—Should the head be affected and the face flushed, cold lotions should be applied and leeches to the temples. In these instructions I have endeavored to adopt the simplest mode of expression to suit the understandings of the poorer classes; and, in conclusion, I again wish to impress upon all persons the necessity of paying prompt attention to the slightest approach of diarhœa, as it may be the means of saving the lives of thousands.

Fashionable Hours.

In London the *elite* breakfast at noon, dine at eight o'clock in the evening, and sup at two in morning, and our "upper classes" are fast acquiring similar bad habits. They do not breakfast and dine quite so late to be sure, but they never think of going to a fashionable uptown party much before midnight, and deem 10 o'clock quite an early hour for the morning meal, and 6 P. M., almost to early for dinner, Hence the pale faces and languid looks of our fine ladies and gentlemen—*for while they imitate* the London and Parisian exclusives in everything else, they do not take one fourth as much exercise. The London exquisite, when he has breakfasted, mounts his horse for a gallop of a dozen miles or so, and the fine lady orders out her pony phæeton, and drives forth in search of roses for her cheeks and appetite for her dinner; but it is not so here. Our aristocracy are chiefly merchants, and must look to their ledgers; and our lady leaders of the ton are too delicate to handle the ribbons

Head Work.

Head work is the hardest work in the world. The artisan feels this if at any time he has to spend a whole day in calculation. All men of learning testify to the same truth, and meagre frames and sallow complexions tell a plainer tale than their words. Sir Edward Coke, the great English lawyer, speaks thus concerning his great work: "While we were in hand with these four parts of the Institute, we often, having occasion to go into the country, did in some sort envy the state of the honest ploughman and other mechanics. For, one when he was at work, would merrily sing, and the ploughman whistle some self-pleasing tune, and yet their work proceeded and succeeded; but he that takes upon himself to write, doth captivate all the faculties and powers both of his mind and body, and must be only attentive to that which he collecteth without any expression of joy or cheerfulness while he is at his work." Will not these words breathe a degree of consolation to many who heedlessly consider that all toil is confined to the working classes?

The telegraph operator, who sent the President's Message to Cincinnati, rejoicing, perhaps, at the conclusion of his work, wound up with the words "God and Liberty," which was inserted in the papers immediately preceding the President's signature. The Cincinnati Commercial says that some thinks it was really attached to the Message, and expresses a desire to see an official copy to settle the point.

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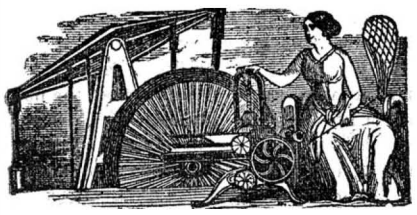


New Inventions.

The Ball Axle.

It is singular to observe the mistakes committed by those "unskilled in the art" in describing machinery. Ten chances to one if the wrong idea is not conveyed, in place of the right one. This we have found to be the case in some extracts which come under our notice of a new invention with the above caption. The descriptions referred to conveyed the impression, that it was nothing more than an axle working in a common box with antifriction balls. Last week, however, we saw the axle, and consider it to be an exceedingly beautiful invention. It consists in this. The bush of the wheel is made to project through to the outside and has a screw cut on it for the nut which revolves with the wheel. No lynch pin is used to couple the axle to the wheel. and the nut is not for that purpose. How is the axle then connected with the wheel? In a very simple manner. A semi-spherical groove is cut in the inside of the bush which projects outside, and a like semi-spherical groove cut on the axle to coincide with it.—Now these two grooves form a spherical groove when matched together. It will therefore be easily perceived that if a ball is dropped in the groove, the wheel and the axle will be perfectly coupled together This then is the ball axle. A small hole is drilled in the bush in which two small chilled iron balls are dropped into the groove, which in the most simple manner couples the wheel and axle together, prevents all lateral motion of the wheel and with very little friction; a small piece of leather in the hole under the nut keeps in the balls. We hope to be able to present an engraving of it in a few weeks.

Atmospheric Pile Driving Engine.

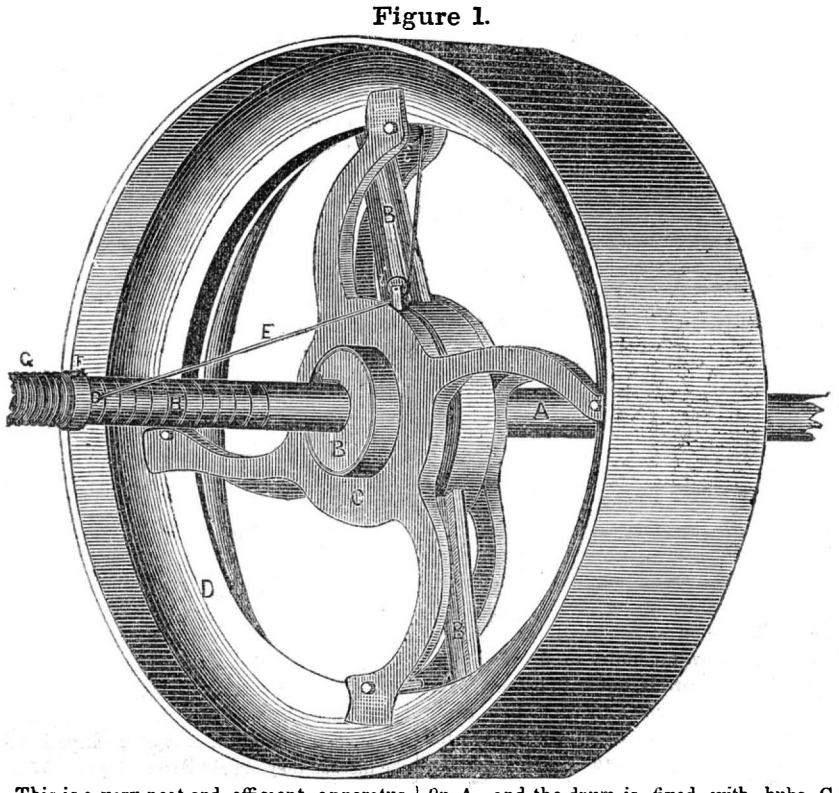
It is well known that a succession of short and rapid blows of a rammer, is more effectual in driving piles than by a number of long blows at greater intervals. It is upon this principle that Nasmyth's direct action steam hammer is constructed, which has been found so useful in this country. By late English exchanges, we perceive that Messrs. Clarke and Varley the inventors of the Atmospheric Railway, (which has been described in our columes,) have recently perfected a plan for driving piles by applying the power of a steam engine, any convenient distance, which by atmospheric pressure is made available by a vacuum cylinder, with its apparatus of self-acting valves, chains and pullies attached to a pile engine, to accomplish the desired object. One machine is now at work on the Thames with the engine on shore, and a very small one it is, driving piles away out on the river. To the engine is attached an air pump for producing exhaustion and communication is made from it to the Pile-Machine by lengths of small galvanized piles, connected by flexible joints. The machine consists of an air-cylinder of wrought iron, open at the top, but closed at the bottom. Within this is a piston, connected by an iron rod to a chain which passes over a pulley on the top of a frame, the other end of the chain being fixed to a suspended pulley; over this passes a second chain, one end of which is attached to a hammer, and the other passes down to the bottom of the engine, whence again returning upwards it is fastened to the top of the pile. The action, then, is this:—The rammer being supposed down on the head of the pile, and the piston consequently at the top of the air-cylinder, the air in the cylinder is now rarified by the action of air-pump above, until the external pressure is sufficient to counter-balance the weight of the hammer; this then immediately rises, and, as soon as the piston has reached the bottom of the cylinder, a motion takes place in the self-acting slides by which the air is suddenly admitted under the piston; equillibrium beween the pressures above and below being thus restored, the rammer immediately falls with its whole force on the pile, bringing in its progress the piston again to the top of the cylinder, when, the slides being reversed, the operation is repeated. Thus a constant succession of short and heavy blows is given, and never ceases until the pile is driven to the required distance into the soil. And as, by the arrangement of pullies, the distance between the pile-head and the rammer is always the same, a regularity of action is obtained quite unknown in the old Pile-Driver.

The machine itself requires no attendance while in operation; only one man is employed occasionally wedging up the pile to preserve its true direction. It is moved with great facility from pile to pile, being very little heavier than the common crab engine. Under the cylinder is placed a small crab, which is used to raise the pile to its place previously to being driven.

This we believe to be the best pile driver ever invented.

MACHINE FOR TESTING THE POWER OF MACHINERY.

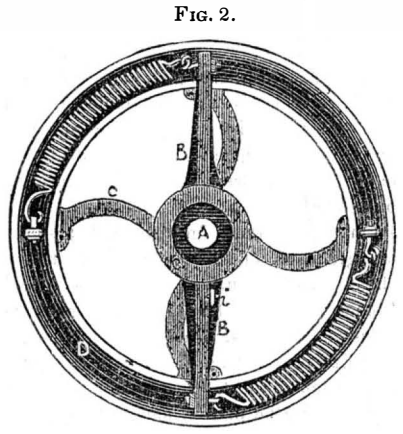
Figure 1.



This is a very neat and efficient apparatus for testing the power of machinery, invented by S. N. Risley No. 278 Fifth st. this city, who is desirous that some person who has funds should engage with him and take an interest in the invention. It has been sufficiently tested and practically in use to prove that it embraces much merit and can be very conveniently attached to any shafting; and would be of great advantage to those who hire their motive power.

Fig. 1 is a perspective view and Fig. 2 an interior section. A is the shaft on which the apparatus is fixed, which simply consists of a band drum D, having two spiral springs confined in an interior groove or channel as seen in fig. 2, and a spiral spring on the shaft connected with a chain to the inside of D, so that whatever machinery there may be connected with the shaft to be driven, it will act upon the springs in a drawback direction like the spring balance, against the power applied by the band on the drum and by having numbers on the shaft 1, 2, 3, 4 horse power, these will indicate the horse power on the belt according as G is drawn by the chain E towards the drum. G, is the coiled spring fastened to the shaft. F is a small collar to which it is at-

FIG. 2.



tached and has a ring on it through which passes the chain E, passing over two small ground pulleys *i i*, the one near the hub of the drum and the other secured by a screw in the interior groove of the drum between two flanges. B B, are two arms, the ends of which play in the inside groove of D and to which the coiled springs are attached as seen in fig. 2. These arms are secured to a fast collar B on A, and the drum is fixed with hubs C, loose on this collar, therefore it will be observed that the machinery to be driven will operate on the shaft to make the arms B B, squeeze the springs in the inside together and draw the spring G in to B, when the power of the driver will be indicated on the index H on the shaft. It must be remembered that in Fig. 2 each spring is attached at one end by screws to the flanges of the drum and by the other end to the arm B. The drum is cast in two pieces concentrically through the middle and the two fastened together by screws embracing the spring in the groove formed by one flange cast on each half with a small space between. We know of no machine for the same purpose as simple as this. More information may be obtained by addressing the inventor post paid.

A Great Discovery Announced.

The London Athenæum states that Dr. Faraday, in pursuing his researches into the operations of magnetism, has obtained evident proofs of some mechanical power, new to our knowledge, and connected in a remarkable manner with magnetism.

We have already given it as our opinion, that it is to galvanism we are to look for any new power that will supersede steam. It would appear reasonable, that an agent so swift, and so powerful as to decompose water and resolve salts into their elementary components, also possesses a latent motive power, which awakened, will produce as astonishing results in mechanism as it has in chemistry.

Velocity of Cannon Shot.

From an extended series of experiments made at Washington Arsenal with the ballistic pendulum, by Capt. Mordecai, of the Ordnance Department, it has been determined that the velocity of a thirty-two pound shot varies from twelve to nineteen feet per second, or nearly twenty miles per minute. The velocity of the electric wave along the telegraph wire is nearly 200,000 miles per second, compared with which the speed of the cannon ball is almost quiescence,

Electricity therefore moves ten thousand times faster than a ball shot from a cannon. Shall we ever see electricity propelling the mighty ship with an economy as superior to the steam engine as the steam engine is superior to the smoke jack.

Great Britannia Tubular Bridge.

The works of this structure, which are of twice the pondrous character of those over the river Conway, have been put in full operations recently, and are already in an advanced state. The platform for this purpose across the Menai Straits alone is half a mile long, and four large tubes, each weighing 1,700 tons, nearly completed. Each tube is 472 feet long, and will have to be floated half a mile along the straits, and then raised 106 feet home. The end tubes are also much advanced. The scaffold or platform on which they are being put together is 100 feet high, 230 feet long, and 60 feet broad, capable of sustaining a weight of 1,500 tons on the top. The cast iron work of the bridge weighs upward of 2,000 tons, and the chains used for raising it will alone weigh 100 tons. It will be floated on eight pontoons. Two of them, are of iron, of 100 feet long, 28 feet broad, 10 feet deep, and capable of carrying 400 tons each. The middle pier, rising out the water from the Britannia Rock, after which the bridge is named, is to be 230 feet high. There are two other piers of the same elevation, and the entire length of the tube bridge across the straits will be 1,420 feet, or nearly one third of a mile. The entire experiments and processes are under the superintendence of Mr. Edwin Clark, civil engineer, who is intrusted with them by Mr. Robert Stephenson.

This is a far greater undertaking than the Tube Bridge described on another page. Considering the greatness of the undertaking, we tremble lest some accident should render it unsuccessful.

The Theory of Spheres.

All bodies in a fluid state, while at rest, and with an equal pressure on all sides, take the form of a perfect sphere. It is another equally well established law that when any such sphere in its fluid condition is put in motion around its own axis, it begins to plunge out around its equator and to become flattened at the poles of its axes—a law which operates equally upon a single drop of water or upon the liquid mass of a forming world.

It is still another natural law that this tendency of a fluid body when rotating, to depart from the form of a perfect sphere and assume that of an oblate spheroid, augments just in proportion to the rapidity of the motion which is communicated to it, the quantity of matter and its specific gravity.

These principles are applicable to the forms of the planets each of which is in accordance with that which a liquid mass so circumstanced would assume—that is to say, while revolving around its axis with the speed of the planet in question, and provided it had the same specific gravity and bulk. Thus, for example, the planet Earth, which has a specific gravity almost five times greater than water, with a diameter of 8,000 miles, and a revolution once in 24 hours, is so flattened at the poles as to cause a difference between its equatorial and polar diameters of something more than 26 miles, while the planet Jupiter, with a specific gravity not far from that of water, with a diameter of 89,000 miles, and a revolution in 10 hours, is so flattened that its two diameters are not equal by the distance of 6,000 miles— the degree of flattening in each case being in accordance with the several conditions above specified.

Hence the forms which bodies assume, granting them to be fluid and rotating, are subject to mathematical laws, so that the quantity of specific gravity and rapidity of the revolution being given for a mass of matter, the mathematician would be able to foretell the precise degree of departure from the form of a perfect sphere which must occur; or, reversing the process and the quantity,t he speed of revolution and the observed form of a planet being given, he can approximate to the specific gravity of the mass.

Improvement in Saws.

We see accounts of a new improvement for a saw mill, whereby it is said, "when the board or plank is cut through, the saw is reversed backwards using thus the return motion to cut as well as the forward motion." Now it is certainly very plain that a saw can be made with double teeth to accomplish the same thing in a more simple and economical manner.

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NEW YORK, DECEMBER 30, 1848.

Advice to our Manufacturers.

The general complaint among our manufacturers in the East, North and Central States, is their "inability to compete with foreign manufacturers at present prices." The complaint we believe to be true in every respect. But out of this there arises a query, why are we not able to compete with foreign manufacturers in coarse goods now, when it has been so often stated that "we could manufacture and undersell them in their own markets?" These things we do not very well understand, and it is not in the range of our objects to discuss the subject—we allude to it as introductory and something on which some light is wanting, without any *pros* and *cons*, but plain facts, for statistical information respecting the progress of our manufactures.

It is well known that we have not as a nation commenced to manufacture fine cotton goods. The finest we believe that are made, are manufactured at York Mills and Ida Mills in this State, but where can we find numbers exceeding 50 in fineness. We know of none spun finer. In England numbers are spun as high as 300, and we are much mistaken if there is a single yard of fine *Mull* made in the Union. What is the reason of this? The cotton used for the fine 300 lace thread manufactured at Holdsworth's in Manchester, England, grows at the South, but has to be carried across the Atlantic to be spun, woven and come back to us in the shape of fine goods. In the bleaching, printing and finishing of fine goods too, we do nothing—all is done up to hand across the water. Have we not capital—have we not mechanical genius—have we not taste to execute such fabrics and finish such kind of goods? Surely we have. We have got excellent foreign artists and operatives among us, and yet we manufacture no goods that we could call "fine." This should not be, and certainly will not for any great length of time. In the manufacture of coarse goods our Eastern and Northern manufacturers have found competitors at home, and competitors that will of necessity drive them to fine manufacturing or shut up their factories, either the one or the other will be the end of the matter in a few years. In our Southern and Western States, there is much energy and enterprise displayed at present in respect to the cotton manufacture, and the maxim is deeply engraven upon the hearts of the planters, that "the factory should come to the cotton field." Who finds fault with this?—None. It is a commendable spirit, and they can manufacture cheaper then we can do in the East. Our Northern manufacturers therefore must soon take up another branch, and that the fine branch of cotton manufacture.

This will bring into requisition more skill—more patience and a finer taste. Well, we believe that there are abundant materials at command, and we hope to see them employed soon.

In saying a few words to our manufacturers we would just drop a hint to our calico printers. What in the name of common sense has become of taste and beauty in the catalogue of your patterns? Do you think that we are always going to be satisfied with a daub of royal blue here, and a dash of green there, as harmonious as crooked sticks moving in indescribable orbits? You have done, and can do, better. Let us have some real old fashioned rich madder colors, that grow brighter as they grow older, end not such colors as are now so common, that look well for a short time but soon acquire an appearance resembling the efforts of the combined skill of a company of tobacco masticators.

In conclusion, for your benefit we are going to commence, next week, the publication of a new process of steam colors for silk and wool, recently discovered in France, and which has been tested and tried, and has proven so valuable that in one instance, we have been credibly informed, $2000 was paid for the Receipt.

Sound and Rapid Motion.

We have received a letter from Mr. E. B. Kenrick, Cambridgeport, Mass., informing us that the paper read before the late meeting of the British Association for the promotion of Science by Mr. Scott Russell and noticed in No. 12 this vol. Scientific American—explaining the phenomenon of sound and rapid motion—had been communicated to him about 10 years ago by Mr. Henry Munro, a distinguished scientific musician. Mr. Kenrick has requested Mr. Munro to furnish us with an account of his discovery, which we will be pleased to publish. "Honor to whom honor is due.

Patent Case.

On Wednesday the 20th inst. another patent case was decided before the U. S. Circuit Court, Philadelphia, Judge Kane on the bench. It was for an infringement of a patent right for making barrels—the complainant Mr. Peters, the defendant Mr. Trapp. The Jury returned a verdict for the defendant. Inventors have been particularly unfortunate before Judge Kane during this term.

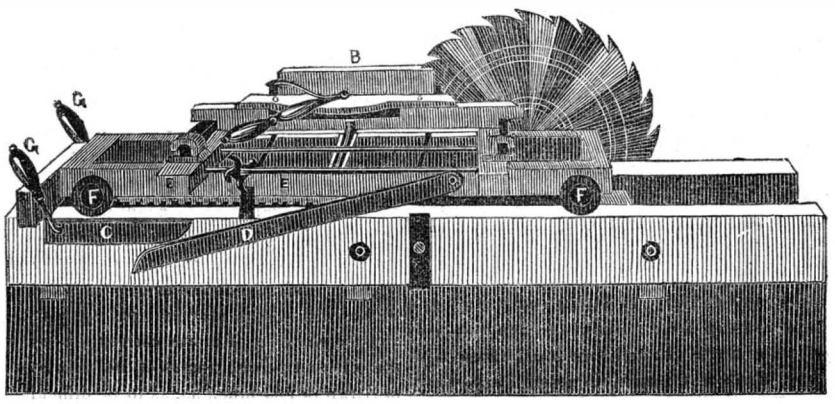
The Telegraph Controversy.

We have received a long communication from a distinguished correspondent, respecting the telegraph controversy between Prof. Morse and Mr. Bain and requesting us to give our reasons for the sentiments uttered by us in No. 13 Scientific American. We will publish the communication next week and give our reasons in full, and which will settle this controversy we believe in the eyes of the American people. We shall publish some facts respecting this invention never before brought into public notice.

Cheap Postage.

There is an association in this city composed of the most respectable and influential merchants, whose object is a cheap system of national postage. At a meeting held recently at the Merchants Exchange it was stated that during last year, 63,000,000 letters passed through the General Post Office, and the Association felt certain that the number would be so largely increased by a reduction of postage, that two cents postage for carrying a letter any distance, would be amply sufficient to defray expenses. So think we. Let us have cheap postage by all means, we have been long enough without it.

JOHNSON'S SHINGLE MACHINE.



This is a machine invented by Mr. J. G. Johnson, of Augusta, Maine, which has justly been praised by all those who have seen it operate and every person who has used it.

Description.—The machinery is adjusted to a frame of 10 feet in length by 3 feet 10 inches in width. On this is placed a moveable carriage E E, which runs on trucks attached to the carriage F F. B, is the block or bolt of wood to be sawed, and is held in its place by dogs. C, is a piece of wood fastened on the end of the frame, the object of which is to cause the lever D to turn the set shaft one quarter round every time the carriage returns back; this lever is raised by a piece of wood fastened to the main frame. To this lever is also fastened a hook, which hooks on to the sett shaft. G G, are handles attached to a rod which has a cam on it. By turning the handles up the rack is raised out of geer and stops the carriage while the operator supplies another bolt or block of wood. The sett shaft has a dog on each end placed at right angles so as not to set but one of the blocks at a time. Those dogs move two guages that are secured to the headstock which holds the block or bolt of wood. The carriage is fed by a decreased motion received from the saw shaft.

For more information see our advertising columns.

Paine's Electrical Light.

Worcester, Dec. 15, 1848.

Gents.—You will perceive by a re-perusal of my Circular that I speak of *decomposing water* by electricity evolved by "*mechanical action*." The water and lime are secondary agents, and in a pecuniary view of no moment, and the consumption of these agents will involve but an infinite (?) portion of the cost of our cheapest "gas lights." Three years ago I exhibited this light in this city during a course of lectures on experimental philosophy.

I do not remember that I have ever "announced" any other discovery than the present one; and as regards my steamer "Excelsior." I do not consider myself responsible to any of the statements that have been made in the public journals, statements which in many instances were as much new to myself as they were to the public.

For your gratification, and in answer to the query in the last paragraph of your article commenting on my Circular, I would remark that the Excelsior was a small iron boat of fifty feet keel and ten feet beam, built as an experimental tug boat for canals and rivers, and that the experiments were successful beyond my expectations. This summer a boat of eighty feet keel and sixteen feet beam, with some modifications, was built at Thompsonville, Ct. and sailed in September for Norfolk, Va, where she is now running successfully on the Dismal Swamp Canal, seven dollars with her doing the work of seventy with horses.—She run through the various canals on the passage at an average rate of eight miles per hour without *wash of any kind*. As regards my Ocean Steamer, I would refer you to the report of the committee of the Mechanic Fair held in this city in September last, and I will likewise add, that the reason why more has not been heard of the progress of my improvements in ocean navigation, is because that parties interested with me, are fearful of compromising their interests abroad by a publication, which would prevent the issue of letters patent. Applications have been made for Great Britain, France, Germany, and the Netherlands, and as soon as the patent is issued in England I shall be most happy to furnish your office with all the details. My new light will "*announce*" itself from the Cupola of our Exchange some dark nights next month, when there will be "no corn in Salem. Yours, Henry M. Paine.

We wish Mr. Paine success and if he can produce an apparatus for less than $30, that will create a light equal to 4000 gas burners and giving out that amount of light for 5 hours every day for a year, then we say that no discovery in ancient or modern times can compare with it. Mr. Paine states in his Circular that he can "produce a light equal to 4000 gas burners at the expense of only 1 mill per hour," or 1 cent for ten hours. Now allowing the apparatus to be employed for 5 hours every day for 365 days, a very fair annual estimate, and we have it "producing a light equal to 4000 gas burners," for $1,82½, a sum, which at the rate of 7 per cent would be interest for an apparatus which would cost only $26,07. Now let us make a comparison between it and the price of gas, its consumption and illuminating power, and we will then see if there is not some reason for our doubts respecting this new discovery. Gas costs in this city $7 per thousand cubic feet, by one, and $4 by another company. Now one large bat's wing burner consumes 2 cubic feet of the $7 gas per hour. But we will make the calculation for the $4 gas. One bat's wing therefore, will consume in 5 hours 10 cubic feet of gas and in 365 days 3650 cubic feet, at an expense of $14,60 per annum; 4000 bat's wing burners will therefore consume $58,400 worth of gas in one year, at $4 per thousand cubic feet, and yet burning 5 hours per day, Mr. Paine by his circular can furnish an equal amount of light for $1,82½. We would state that our calculation is not based on speculative reports, but the practical working of our gas burners day by day. We have given Mr P. the benefit of our lowest calculation.

Mr. Paine is admitted on all hands to be an accomplished and exceedingly ingenious mechanician, perhaps he has no superior, but in this case, we think, and we have in a straight forward manner given our reasons why he has not submitted his electric light to the *experimentum crucis* of a correct calculation.

The Subterranean Lake on the Central Railroad, Michigan.

In reference to this lake, which we noticed some time ago in the Scientific American, the Detroit Free Press says: "The sudden disappearance of the embankment was accompanied by tremendous convulsions of the ground for some distance around where the casualty occured, and cracks were caused by the upheaving of the ground, deep and large enough to bury a cart and horse in. From exploration and researches made, it appears that the piece of ground over which the grading was to be made had once been a lake, but was now covered by a soil of roots, muck, &c. to the thickness of from ten to twelve feet. The submerged lake is about two miles long, and is in parts half a mile wide. At the place where this railroad track crosses, it is the narrowest. At one end of the lake is what appears to have been an island, as there are trees of large growth standing, while on nearly the circuit of the lake the ground or surface of ten feet has become so hardened that the best of grass is grown, and the spot has been regularly mowed this several years. We believe, in some parts of it, good potatoes have been grown. The depth of the lake is ascertained to be about 80 feet in the deepest part, and the water as clear and pure as that in the river at this city.

After the sinking of the first grading the work was pushed ahead with increased strength and for eight months, 80 hands were employed continually, day and night, one set retiring as the other came on to the work—As the embankment gradually extended out over the part that sank into the sod and crust, again it would become so heavy that another sinking would take place, and in this manner the work has been going on. The excavation and embankment was after a while commenced on both sides of the lake, and last week the contractor says the filling in had met at the bottom, and the prospect was that no more trouble would be found in rapidly completing the work. The above number of workmen have been engaged at this point for fifteen months. Eight months of the time as before mentioned, day and night. It has cost an immense sum to accomplish the original plan adopted of crossing at this point, but like everything else undertaken by this Company, goes straight forward."

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Modern Inventions.—An Iron Bridge of a Single Tube.

The present age is mighty in enterprise and gigantic in intellect. The wonderful that have crowded upon one another so rapidly during the last eighteen years, have no parallel in grandeur nor in the display of masculine genius. All the works of the ancients piled together are dwarfed when ranged alongside of the discoveries of Watt, and made more pigmy still, since Fulton harnessed the ocean to our "*leviathans* of the deep." With the works of these mechanics, every school-boy is now acquainted, but beside these, other great inventions have like new planets burst upon us oftentimes during the space mentioned above. We will not allude to these at present, but we would bid those who look upon the structures of old as the *alpha* and *omega* of human genius, to follow us for a few brief moments, while we describe a work which has lately been executed, and the like of which, Rome in all her glory could not boast of. Since the introduction of railroads into England, that country has projected and completed works of such magnitude, that they appear more like the labors of Titans than men. Among these we may mention the tunnel of the Thames and various other tunnels. Mountains have been pierced to make way for the rolling locomotive, as well as rivers raised upon the shoulders of those iron barricades, that have effected a greater revolution in the social condition of her population by far, than those that might dethrone a monarch or defeat a tyrant host. But famous though these tunnels be, we believe they must yield in originality of conception and scientific daring to the Bridge made of a single tube of Iron which was thrown across the river Conway last spring. This bridge stands out as the monument of a distinct and grand idea that will give immortality to the inventor. Mr. Robert Stevenson, son of George the successful inventor of the Locomotive, was the first to propose an iron tubular bridge. The first form proposed was a tube of a circular form, but Mr. Fairbairn of Manchester, a skilful engineer, becoming associated with Mr. Stevenson, experiments were tried which resulted in proving the square form far superior to the circular in every respect. After many experiments to discover the best contrivances to resist vertical and lateral torsion a model was formed of a square shape with longitudinal cellular compartments, square at the top and bottom. This model was 80 feet long, 4 feet 6 ins. deep, 2 feet 8 ins. in breadth, and rested on two supports, leaving a space of 75 feet between them. It weighed about 5 tons and was subjected to the severest tests to prove its strength. A weight was attached to its centre, and increased ton by ton, and the deflection carefully noted. After three successive experiments, it was discovered that its breaking weight was 56 tons, that is, the model only weighing 5 tons of 75 feet in length could stand the enormous pressing weight at its centre of 56 tons —more than 11 times its own weight—a result highly satisfactory, Mr. Fairbairn concluded from this experiment that hollow beams of wrought iron constructed on the same principle, whether used for bridges, or buildings, were three times stronger than any other description of girders,—to this *fact* we desire to call the particular attention of our engineers.

The great tube was built and finished in about 12 months after it was commenced. It is 412 feet long and weighs 1300 tons, and formed of wrought iron plates from 4 to 8 feet long and about 1 inch in thickness. The plates were rivetted firmly together to ribs of T angle iron on both sides of the joints and by those who have seen the workmanship, the regularity of the rivetts gives the great tube a highly ornamental character. This was done by employing a punching machine upon the principle of the Jacquard loom, which performed its work with wonderful precision and rapidity.

The ceiling of the tube is composed of eight cellular tubes, each of 20 inches in width and 21 inches high, formed of wrought iron plates three quarters of an inch thick in the middle and half an inch towards the end of the tube. The floor consists of six cellular tubes 27 inches in width and 21 inches in height,—with a plate of iron covering every joint on the under side. The sides are united to the bottom and ceiling by double angle irons within and without. The entire length of the tube is 412 feet, 14 feet wide, 25 feet high in the middle and 23 1-4 at the ends.

To the sensitiveness of iron to atmospheric changes or temperature, the skilful engineers were not blind in applying a compensation base to provide for the expansion and contraction of this stupendous fabric of iron, consequently the ends of the tube were made to rest upon 24 pairs of iron rollers connected together by a wrought iron frame, and the tube also partly suspended to six cast iron beams under the extremities of which were placed twelve gun metal balls of six inches in diameter to act as castors to the ponderous bridge, and facilitate its expansions and contractions.

The huge mass was floated from the spot where it was constructed to the spot where it was to be erected on six pontoons on the 6th day of March 1848, amid a crowd of wondering Welsh peasants and as it was built about 100 yards from its site and had to be fitted to its position in one mass, we consider this single successful operation one of the most signal triumphs of scientific skill ever exhibited. How the hearts of the projectors must have throbbed with feverish anxiety, lest some unlucky accident, or some unforseen defect should cap the climax of their weary studies and watchings, and doom them to disapointment and disgrace—beside General Pasley's spleen, who high and lordly *proved* its failure before its commencement, a common thing with the merely scientific, who have not the good fortune of the practical along with it. But the ponderous iron giant was built, was floated and fitted into its foundations, without a single accident to mar the sublime undertaking.

This great mass weighing 1300 tons had to be lifted from the pontoons 24 feet in the air. How was this done ? Simply by the pressure of water forced through two small tubes only three eights of an inch in diameter. These were two Bramah force pumps one at each end of the pier, driven by two steam engines. As an evidence of the wonderful power of water as an incompressible body, let us describe the operation : Each hydraulic ram or pump consisted of a cylinder three feet in diameter to the outside with a cylindrical cavity of about a foot and a half in diameter—of the actual thickness of nine inches of solid iron all round. Into the cavity of this cylinder was fitted the ram, as it is called,—a mass of solid iron 17 inches in diameter, so that it did not fit the cylinder quite accurately, but left a vacuity for the passage of the water to the bottom. Attached to the top of this ram was a *cross head* two square feet thick, with two square apertures for the chains to pass to lift the tube. The chains were of flat bar wrought iron 7 inches wide and 1½ thick, and 6 feet long. The stroke of the ram was 6 feet in its full range. Two high pressure horizontal engines were to do the work. Each cylinder had a piston rod running through each end connected with the plungers of force pumps having a stroke of 16 inches. At the top of each hydraulic press there was a small tube three eights of an inch in diameter and connected with the force pumps. These two little tubes were the channels of the mighty power to lift the whole structure. Insignificant in appearance—no bigger than a large quill, we well may admire the scientific attainments that through them with a stream of water no thicker than sometimes trickles from the cheek of beauty, this mighty mass of iron was borne up in mid air, like the fabled coffin of the prophet at Mecca.

After the engines commenced working and the small streams were rapidly forced into the tiny tubes, the mighty tube arose slowly but grandly into the air. At every six feet the engines were stopped and the chains re-adjusted to the head of the ram and by a succession of such rises, the tube finally reached the desired elevation, 24 feet, and dangled in the air, as the play thing of the two hydraulic engines, and then it was laid upon its foundations as a monument of engineering skill unsurpassed in any age or country. Since then the locomotive with its train has thundered across its iron pavement, and we hope it will stand for ages, the praise and admiration of future generations.

Gold in Borneo.

Gold is met with under singular circumstances, with limestone :—The gold is found in three situations,—in crevices of limestone rocks, in alluvial soil, and in the sand and gravel of the rivers ; it is found chiefly on the western and southern portions of the Island ; but is not obtained in any quantities to the northward. In Sarawak, Sambas, Sangow and Banjar it appeals most to abound In Sarawak it is found in all parts of the country on the right hand or western part of the river, beyond the influence of the tides ; it is found also in the southern branch, but in less considerable quantities. In the crevices of limestone it is worked by Malays. Last year, (says a traveller,) I accompanied Mr. Brooke on a visit to the rocks. The place they were then working was about four miles distance from the river, and about that distance from Seniapan and Tundong. The place was called Rattu Kaladi, and was a limestone hill about two hundred feet in height, the surface of which was worn, like all the limestone rocks of the country, apparently by water into ridges so sharp that it would have been exceedingly dangerous to have fallen upon them.—Amongst these ridges were holes, very small, continuations of which penetrated into the heart of the mountain, some of them being forty or more feet in depth. The only difficulty appears to be in the labor of making the aperture sufficiently large to admit the miner ; but this accomplished, on his descent he found the bottom, which invariably opened to a cave, covered with earth of a loamy nature. This, on being brought to the surface in baskets, was washed, and it was stated produced a bengkal of gold—about one and three quarters of an ounce—from each bushel of earth, from six to ten or twelve bushels being found in each cave, according to its size. It was accordingly a very gainful speculation, and the working of it was carried on by all the idle and poorer classes of the community of Sarawak ; so much so, as to be difficult to hire men for ordinary work. Gamblers repaired to this employment, and a few weeks exertion soon repaired their ruined fortunes ; so that by supplying them with funds to encourage them in this vice, it is perhaps no advantage to the settlement. The Chinese, who are not permitted by the Malays to work in the rock, were quietly trenching the earth at the foot of the hill, which they had long worked for the same purpose, and with more certainity of profit, as it is not always that the caves, after the labor expended in getting into them, are found to produce the coveted metal. How the gold should be discovered in these fissures at all is very remarkable, and perhaps may afford a curious fact for the study of geologists and mineralogists ; it cannot have descended from any place higher, as the caves are found in the highest as well as on the lowest parts of the surface on the be-topped hill ; nor, after repeated examinations of the limestone, is the slightest trace of the metal discoverable in it ; the surface of the rock is but scantily furnished with earth, and that is of a vegetable nature. It is true that the whole of the soil of the surrounding district is alluvial and strongly impregnated with gold, but not nearly to so great an extent as that found in the fissures above described ; hence the soil in these differs in the relative quantities it contains. The golden shower into which Jupiter is fabled to have transformed himself appears to have fallen here.

Always have some Work in Hand.

Industry is the parent of wealth ; and it is a bad sign when people have nothing to do. In such cases it is best to find employment at once in seeking it. But in the multiplicity of things to be done in this world, it is rarely possible to be placed, except by choice, in a do-nothing position. It is the influence of vices and bad habits which so often creates a distaste for our real duties, and in fact unfit us for their performance. Stick therefore, to the maxim " Always have some work in hand."

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A Word to Parents and Teachers.

It is related of Socrates, the greatest master of ancient Greece, that he saw in a dream a beautiful white swan flying towards him from the altar of Venus, and lighting in his lap. In a little time the bird spread his wings again, and rising in the air, went up, up, till it disappeared in the clear sky. The next day, while he was relating the dream to his pupils, Aristo came leading to him his son Plato. Socrates fixed his eyes upon the lad, surveying his broad high forehead, and looked into his deep clear eye, and exclaimed,—'Behold the swan of my school.' He nursed the boy with parental pride and parental hopes ; and the swan of his school became the noblest mind in the literature of his country, and has impressed its influence more sensibly upon the Christain ages than any other uninspired intellect.

The above text appears among other good things in a late Report of Commissioner Haddock of New Hampshire. Such a text would be a good basis for a sermon to teachers but the text is good without a sermon, and it is questionable whether its force and beauty could be increased by amplification. We are reminded of the Scotch lady who in the house of God had been brought to the knowledge of the truth. On visiting the good pastor for conversation, be asked her under what sermon she was converted ? "Sermon !" said she, "there was no sermon that could do that. It was the text." So the text intimates to the teacher that there is thrown into his lap for nurture, instruction, and admonition, those who like this white swan shall ascend to brighter regions.

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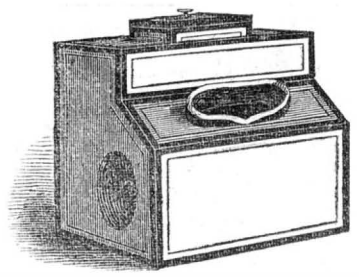

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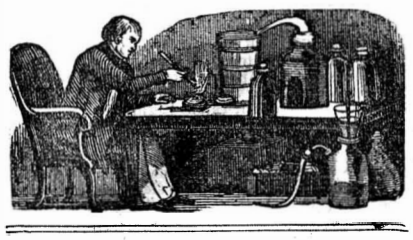


For the Scientific American.

New Chemical Law.

No. 15.

In the application of this law to the presently considered elementary substances, we have shown the existence of four classes of aggregated series which must evidently be derived by the aggregation of their respective radicals. We have shown in the first place that such a law does in reality exist, among numerous examples of known substances, and that it possesses a number of unchangeable conditions, by which it can be proved. In substances of known composition, we have applied the law and obtained the conditions.—But in the substances of unknown composition, that is the elements, we have applied the conditions, and obtained the law, which gives us the true form of their composition. The application of the law in the two cases we have shown to be entirely similar.

The only real difference between an elementary aggregated series, and one of known composition, is that the particles of an elementary aggregated series possess a stronger affinity for each other than those of known composition. This is the reason why the elementary series have never been decomposed the attraction of their particles for each other being much stronger than the agency employed for their separation. Their power of withstanding the effects of all agents employed for their decomposition is therefore no reason against their consisting of aggregated series.

This law, therefore, revives the ancient opinion of the alchemists, concerning the transmutation of the elements, and render it exceedingly probable that by a suitable application of the means many of the elements may be transmuted. If the experiments of De la Rive, instituted to aid in the history of muriatic acid, as given in XI. Vol. of the American Journal of Science, page 393, are correctly performed, chlorine has already been transmuted into nitrogen. He found by a number of experiments upon the metallic chlorides, that nitrogen was evolved, although not a particle of a substance containing nitrogen was used in the experiments. From what source then could the nitrogen be derived, but from the transmutation of the chlorine?

The transmutation of chlorine into nitrogen is a result precisely similar to what the law would indicate and is probably true, as the experiments were instituted expressly to aid in the history of muriatic acid, and therefore the developement of nitrogen was unexpected. Probably if the bromides and iodides were used instead of the chlorides, we might obtain the same result. If we call the law to our aid to explain the transmutation as it occurs above, it will indicate that as they both belong to the same aggregated series, that the aggregated atom of chlorine is broken up into its original radical particles, which again instantly aggregate by pairs forming atoms of nitrogen Thus, the experimental atomic weight of chlorine is 35.42 : the original atom from which it is aggregated, must therefore possess the atomic weight of 7.08. Now as these original atoms unite by pairs to form nitrogen—the atomic weight of nitrogen by this method should be 14.16, agreeing closely with the atomic weight of nitrogen 14.15, as found by experiment. This was not the result of a single experiment but of several, each one instituted in a different manner and upon different substances.

Were we in possession of the means and power the law would indicate that we could resolve the aggregated particles of all substances whatever into one ultimate primordial atom, which would constitute a gas of infinite subtlety, and there is not much doubt but that the first form of matter consisted of this gas, and that by the law of aggregation all other matter was produced. To the numerous conditions which the law already possesses, many more remain to be added. The specific heats of all substances aggregated from the same radical is probably equal for each particle in the series, although I have not had the opportunity of investigating the subject. The same may probably be said of their specific electricities.

It is much to be desired to know the exact laws which govern the specific gravities and boiling points of substances belonging to the same aggregated series or its compounds. The law which governs the boiling point is probably very simple and dependent upon the atomic weight and specific heat of a substance.

The law is at present in its infancy, but is destined to produce a great change in Organic Chemistry. It is much to be hoped that chemists will take the matter into consideration and test it thoroughly—by so doing they will be convinced of its truth and immediately apply it to the numerous substances in organic chemistry which have no apparent connection and also to the remaining elements.

S. N.

Bridgeport, Conn.

Magnetic Attraction

If a magnet be brought into contact with some iron-filings, they will adhere to it. The filings are strongly attracted to each pole, but none of them to the centre of the bar. It appears, from this circumstance, that the magnetic power resides chiefly in the poles, and that there is part of the magnet, generally midway between them, where little or no attractive power is exerted.

The north or south pole of one magnet repels the north or south pole of another, just as bodies similarly electrified repel each other. If a magnet be dipped in iron-filings they will immediately become attached to one end.—Supposing this to be the north pole, each of the ends of the filings, not in contact with the magnet, will become north poles; while the ends in contact will, by induction, become south poles. Both of these will have a tendency to repel each other, and the filings will, therefore, stand on the magnet. The ends of the filings in contact cannot repel each other, because they are so strongly attracted by the pole of the magnet; but at their other ends, where this force is not exerted, they do repel each other, showing that they are in the same magnetic state.

POLARITY OF THE MAGNET.

If a piece of steel, that has been rendered magnetic, be supported so that it can turn freely it is found to point with one end to the north, and the other to the south. This property may be pleasingly illustrated, by tying a magnetised piece of steel round its centre with a piece of sewing silk, and supporting it from a stand, as the pith balls are supported in various experiments. Another method is, to place a magnet on a piece of cork swimming in a basin of water. If the cork be placed in the centre of the basin, so that it is not attracted by the sides, the magnet will be found to turn due north and south, the same as the mariner's compass, which in case of accident at sea, it might be made to supply the place of.

HOW TO MAKE A MAGNET BY GALVANISM.

Galvanism is capable of forming magnets out of common steel. To effect this, make a connection between the poles of an excited battery with the two ends of a wire formed into a spiral coil, by bending common bonnet wire closely round a cylinder, or tube, of about an inch in diameter; into this coil introduce a needle, or piece of steel wire, laying it lengthways down the circles of the coil. In a few minutes after the electric fluid has passed through the spiral wire, and, consequently, round the needle or wire, the latter will be found to be strongly magnetised, and to possess all the properties of a strong magnet.

The same effect may be produced by passing a charge through this spiral coil from an elctrical battery.

If a current of electricity be made to pass along a wire, under which, in a line with it, a compass is placed, it will be found that the needle will no longer point north and south, but will take a direction nearly across the current, and point almost east and west. This fact has led philosophers to believe, that there are constant currents of electricity passing east and west across the earth, and which, therefore, cause the needle uniformly to point to the north.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

WILCOX'S ROTARY ENGINE.

This rotary is the invention of Mr. R. Wilcox of Bristol, England, and patented in 1805.

FIG. 27.

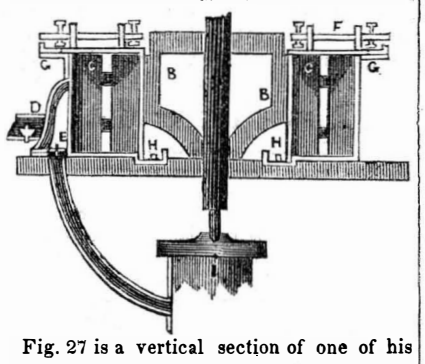
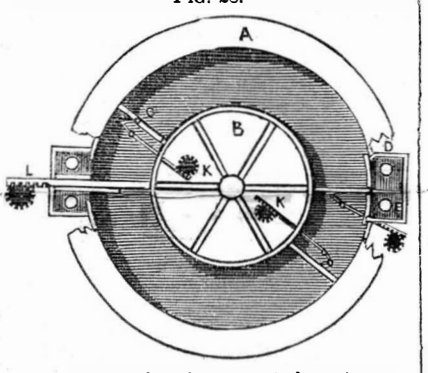


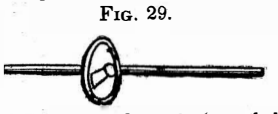
Fig. 27 is a vertical section of one of his plans as attached to the common condenser for the purpose of shewing one of the most simple and compact arrangements, where the steam is condensed. A, the outside case or cylinder fixed to the framing of the condensing cistern, or any other more suitable and convenient framing that the engineer, may find more appropriate or suitable to the velocity of the premises, where the engine is to be erected. B B the inside or revolving cylinder, attached to and connected with the vertical shaft, which is the first mover, and which gives a rotative power to any description of machinery requiring the same, through the medium of a spur wheel fixed to the said shaft, when a vertical motion is required; or with a bevil gear wheel, where an horizontal motion is wanted. C C moveable pallets, gates, or valves, for regulating the operation of the steam in the engine; one of the said pallets, &c. is attached to the fixed cylinder A, and the other to the interior cylinder B, as is more

FIG. 28.



distinctly seen in Fig. 28, and the references annexed. D the steam valve for the admission of steam between the said pallets. E the exhausting valve for the egress of steam. The gear required for the opening and shutting the valves D and E, and for shutting the said pallets or gates C C, is so nearly similar to that of common engines, that it would be useless to describe it more than the said valves D and E require to be opened and closed at the same time, whereas, in general, they are opened and shut alternately by the plug tree, or other simple and well known means F the top of the cylinder, composed of a ring of metal, for pressing the packing round the moveable cylinder, the lid is screwed down with screws, as is usual in screwing the lids of the tops of cylinders. G G, two rings of metal pressed by screws, from a lever secured to the top of the cylinder F, for compressing the packing, and securing the joint of the cylinders A B. H H, a circular channel into which the revolving cylinder B works, for the purpose of preventing the ingress of air or other fluids into or by the said interstice or channel, and which is packed with hemp and grease, and pressed in such manner with a ring as thereby to render the engine more efficient, by keeping it perfectly tight. I the common condenser, the air pump of which, is wrought by studs or stops projecting from the horizontal shaft, or any other simple or effectual way the engineer may think proper, as is more distinctly seen

FIG. 29.



in Fig. 29, which is the end view of the skaft and the side view of the piston rods; the operation of which is so obvious, as not to require elucidation. Fig. 28 exhibits the bird's eye view of Fig. 27, with the top of the cylinder and compressing rings removed, to show the operation or apparatus for opening and closing the pallets, gates, &c. and also part of the flanges removed to show the situation of the valves. The letters of reference in this case of Fig. 28, are placed upon the same parts of the engine as in Fig. 27, which it would be superfluous to recapitulate. C C the pallets, &c. formed of two or more pieces of metal; one part of the said pallet is permanently secured to each cylinder A and B, whilst the other part or parts turn on a joint or hinge; which said joint or hinge is made steam tight or secured, together with the whole of the edges coming in contact with the cylinder, with a hemp cloth stuffed, wadded, or folded together, or by other similar materials, capable of stopping the passage of steam, and which must be screwed or fastened on the front of the said pallet; and by the pressure of the steam it is pressed or brought in contact with the said pallet or cylinders, and thus it effectually prevents the escape of steam, or other fluids by or with which the engine is wrought. K K two racks and pinions, communicating by a straight and parallel bar, working through a stuffing box in the sides of each cylinder, whereby the said valves are opened and shut, whilst passing each other, from the external part of the engine by a piece projecting from the under or lower part of the fixed cylinder, which may be placed at the option of the engineer; which said piece in its passage comes into contact with the gear connected with the said pallets, and thereby with any of the well known simple methods or gear used for opening and shutting of valves in the present steam engines. The gates, &c. of the engine are opened and shut as occasion requires. L, Fig. 28 exhibites a second gate, &c. which in this case slides backwards against a straight parallel surface during the time the pallet in the revolving cylinder is passing when the said gate is sliding by the gear against the revolving cylinder, as in the drawing. The said gates may be opened and closed in a variety of ways, such as a spindle ground into the bottom of the fixed cylinder, and connected by a link to the gate internally, or a crank or compound lever may be applied instead of the rack and pinion externally.

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